

## **Final Project Report to the NYS 1PM Program, Agricultural 1PM 2003-2004**

**Title:** Cut Flower 1PM Resource Development: Weed Management and 1PM for Cut Zinnias from Seed to Harvest

**Project Leader(s):** Jana Lamboy, NYS 1PM Program  
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**Cooperator(s):** Leslie Weston, Department of Horticulture, Cornell University  
Andrew Senesac, Suffolk County CCE

**Type of grant:** Pheromones; biorationals; microbials; conventional pesticides

**Project location(s):** Applied research project took place in Erie County; findings will apply to any cut flower field in the Northeast

### **Abstract:**

We conducted an efficacy study at a commercial cut flower field comparing two organic herbicides with glyphosate. A diverse population of weeds was growing in the paths between rows of cut flower plugs set in holes in black plastic. Three weeks after treatment, all three products appeared equivalent in the ability to knock down the weeds; all appeared dead except clover. Re-growth took place eventually in the clove oil and pelargonic acid treated plots, and they were treated a second time, with a mixture of glyphosate and pelargonic acid herbicides. Cost will be a key feature in the decision whether to use these organic herbicides.

### **Background and justification:**

According to many cut flower growers, weeds are the most troublesome and costly pests they manage. The competition from weeds can reduce yield, increase the cost of harvesting, and complicate management of diseases, insects and mites. The challenges of weed management include the many different species of plants grown in a cut flower field, different times of planting, and the susceptibilities of the crop plants to damage from herbicides. Many cut flowers are perennials, so that mowing or cultivation between seasons is not an option.

Recently, organic reduced risk products for weed management appeared on the market, but Cooperative Extension Educators and weed scientists are reluctant to recommend them without experience in their use. David Chinery found that acetic acid based herbicides could be used for broad-spectrum turfgrass and weed management, with several weeks of control from a single application (2001 NYS Ornamentals Project Reports Relating to 1PM). In a roadside study conducted by Dr. Leslie Weston and Dr. Andrew Senesac for the Department of Transportation, the reduced risk products were not able to manage tough perennial weeds. This applied research project in a cut flower field was designed to compare two products approved by the Organic Materials Review Institute, clove oil (Matron) and pelargonic acid (Scythe), with glyphosate for weed management between rows of cut flowers planted in black plastic.

Glyphosate, or RoundUp, is a very widely used herbicide that is commonly perceived as being safe. Information cited from analysis of 117 studies in the US links the incidence of lymphoma or death with high pesticide exposure levels. The greatest risk was associated with 2,4-D and

triazine herbicides. Glyphosate, lindane, carbaryl, diazinon, dichlorvos, and nicotine are other pesticides linked with Hodgkins and non-Hodgkins lymphomas (Lymphoma Foundation of America). We hoped to find alternatives to glyphosate that we could recommend. The organic products and glyphosate should be used with care to avoid exposure, including protective clothing as recommended on the label.

### **Objectives:**

The goal of this project originally was to develop some specific resources for cut flower growers, and to establish a web site with fact sheets and links for them. Comments from the Ornamentals IPM Committee led us to focus on the weed management aspects, the fourth objective. An article on sustainable weed management for cut flower growers will be written by the first author to accompany a talk at the Empire State Fruit and Vegetable Expo on February 12. IPM for cut flowers will be featured at the regional meeting of the American Specialty Cut Flower Growers at Cornell in conjunction with the Floriculture Field Day, on July 28, 2004. The development of the web site will be a continuing goal.

1. Describe the choices available for weed management, including mulches.
2. Prepare a season long guide to IPM for zinnias, from seed to autumn frost.
3. Put the new fact sheets on the web after review.
4. Demonstrate some IPM techniques such as new organic herbicides, at the cut flower farm belonging to Roxanne McCoy.

### **Procedures:**

The most appropriate site for the weed management trial at Roxanne McCoy's farm, Lilies of the Field, was determined to be the paths between rows of zinnias, snapdragons, lisianthus and statice plugs set out in black plastic. The goal of the herbicide treatments was to clear the paths and prevent weed seed set by killing the weed plants. Twelve one-square-foot field plots were marked with flags in three different paths, and photographs were taken of the weeds on June 18. Weed species were identified in each square. The trial included a path treated with clove oil (Matron), a path treated with glyphosate (RoundUp), and a path treated with pelargonic acid (Scythe). There were four squares in each treated path, a total of 12 plots in the project.

It was a very rainy spring, making it difficult to time the applications and assessments. Treatments were applied according to labeled rates. Three weeks later, on July 10, the site was observed closely and photographed again. In mid August, the clove oil and pelargonic acid treated paths had grown back, and were treated with a mixture of RoundUp and Scythe, both at the low rate. The RoundUp treated paths were not perfect, but did not need to have a second treatment.

### **Results and discussion:**

The assigned plots contained grasses, oxalis, smartweed, Galinsoga, ragweed, clover, wild daisy, ladythumb, chickweed, Cinquefoil, dandelion, Amaranth, groundsel and plantain. These are weeds that either survived the field plowing before the rows were established, or germinated after the plowing. The most common weeds were grasses, ragweed, and smartweed. The photo prior to herbicide application shows lush green vegetation about 15 inches high at the time of treatment.

Three weeks later, the only vegetation that was green was clover. Every other plant species was knocked back. The grower was very impressed, since the glyphosate, clove oil, and pelargonic acid treatments all looked the same, dead. The safety of the alternative products was greatly appreciated, and the grower asked about details concerning their cost because she was thinking she might want to use them in another season. A few weeks later, we were disappointed as weeds appeared in the pathways, and a second herbicide application (glyphosate plus pelargonic acid at lowest labeled rates, not given here) was applied to the clove oil and pelargonic acid plots to kill the plants and prevent seed set.

Cost of the treatments:

Product	Cost	Rate used	Cost per 10 gal solution
Clove oil (Matron) <sup>1</sup>	\$200/2.5 gal	20% solution	$\$80/\text{gal} \times 0.2(10 \text{ gal}) = \$160$
Glyphosate (RoundUp) <sup>2</sup>	\$173/2.5 gal	2% solution	$\$69.2/\text{gal} \times 0.02(10 \text{ gal}) = \$13.84$
Pelargonic acid (Scythe) <sup>2</sup>	\$94/2.5 gal	7% solution	$\$37.6/\text{gal} \times 0.07(10 \text{ gal}) = \$26.32$

<sup>1</sup>Biocontrol Network, Brentwood, TN

<sup>2</sup>Griffin Greenhouse and Nursery Supplies, Auburn, NY

The cost of the clove oil product compared to glyphosate was prohibitive for the conventional cut flower grower, although she preferred to use it because of great aroma and safety. The pelargonic acid was considerably less expensive and didn't smell bad; the mixture with glyphosate worked very well. This might be the most practical compromise in terms of cost and safety. The grower highly recommends Matron and Scythe for a setting where organic cut flowers can bring a higher price, and also for homeowners, who are not certified applicators, tend not to wear protective clothing and who, in her opinion, should not use toxic materials.

This project demonstrates that the organic herbicides can be effective products in settings like spring cut flower fields where the weeds are growing fast and tender. Long-term management would require repeated applications for best results.

#### References:

Lymphoma Foundation of America Research Report: Do Pesticides Cause Lymphoma? located online with a search for **lymphoma incidence and pesticides**, or [www.lymphomahelp.org](http://www.lymphomahelp.org)

Why Canadian Physicians are Concerned about the Policies Regulating Pesticide Use  
[www.cape.ca/toxics/pesticideskelly.html](http://www.cape.ca/toxics/pesticideskelly.html)

#### Samples of materials:

Photographs of the weed trial plots prior to treatment, and three weeks after application, a close up of the clove oil treatment



The annual cut flower field prior to treatment on June 18, 2003



After treatment, clove oil plot, July 10, 2003

